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A DIGEST OF THE ANNUAL REPORT OF THE BARBERRY
ERADICATION CAMPAIGN IN SOUTH DAKOTA, 1927

U. S. Department of Agriculture
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Introduction

Black stem rust is the worst enemy of the grain grower in the Northwest. It is the biggest hazard that the producer of cereal grains faces in his efforts to harvest a profitable crop. During the last ten years its yearly toll in South Dakota alone has averaged almost 9,000,000 bushels of grain.

Barberry eradication has been found to be an effective means of reducing these excessive stem-rust losses. This project was started in South Dakota in April, 1918. Since that time the task of finding and destroying this harmful bush has continued as rapidly as possible with the time and funds available.

The results of this campaign are highly gratifying to those who understand the campaign and have followed it. Every year from 1918 to 1927 the total number of bushes found and destroyed has increased until 131,725 barberries, large and small, have been destroyed on 1,244 properties in South Dakota. The willingness of the property owners and the support of the citizens and organizations within the State have made these results possible.

The barberry eradication campaign in South Dakota is directed by a State Leader, under the supervision of the Office of Cereal Crops and Diseases, Bureau of Plant Industry, United States Department of Agriculture, Washington, D. C., in cooperation with the South Dakota State College, the State Department of Agriculture, and other State and civic organizations. The Conference for the Prevention of Grain Rust, Minneapolis, composed of representatives of agricultural and allied interests, cooperates closely with the campaign.

Financing

As it is under Federal Supervision, barberry eradication is financed almost entirely by Federal funds. Since its beginning ten years ago, only \$15,000 in money has been furnished directly by the State. During the same period more than 12 times as much has been received directly from the Federal Government. Splendid support and some valuable indirect aid have been given by various organizations and institutions within the State. The total cost to the Government and the State for finding and destroying 131,725 barberries in South Dakota has been less than \$3.00 per farm. On the other hand, the annual stem-rust loss in this State is estimated to have been about \$125 per farm during the last ten years. In certain years losses have been much higher. In 1916 the average loss per farm was approximately \$800.

Survey for Barberries

Three types of survey have been used in finding barberries. These are the first or preliminary survey, the second survey, and the resurvey.

The first or preliminary survey was a property-to-property survey in cities, towns, and villages and a farm-to-farm survey of all rural properties in the State. The purpose of this survey was the destruction of the largest number of bushes in the shortest possible time. Every barberry destroyed lessens the chance of stem rust infection. Therefore, at the beginning of the eradication campaign more emphasis was placed on destroying a large number of bushes than on getting every bush as the survey progressed. The first survey was completed in 1924.

The second survey is more intensive than the first. On this survey every foot of every property upon which barberries may be growing is searched for barberries. The field agents on second survey locate not only the straggling bushes missed on the first survey, but also the new bushes which have grown from seeds scattered from the planted bushes by birds or other agencies. (See Map No. 1.)

Some one may ask if it would not have been better to have gone slowly on the first survey and taken time to find every bush. Had that plan been followed, only a small portion of the State would have been covered yet, and all of the bushes in the unsurveyed portion would have been causing damage during all this time. As it was carried on, the greater portion of the bushes was found and eradicated within a few years. Naturally some bushes were missed on the first survey, and these are capable of doing some damage, but the chance of great damage was reduced materially in a few years by speeding up the work and covering the whole State.

Resurveys are reinspections of the properties on which barberries have been found and destroyed. Such resurveys are necessary to find and kill sprouts and seedlings developing where bushes were destroyed in the first or second surveys.

Summary of All Activities, 1927

Second survey constituted the major activity in South Dakota this year. Due to the intensive type of work necessary of second survey, only about three and a half counties were covered this year. Resurvey of old barberry properties was carried on in connection with the second survey. In addition, a resurvey was carried on in nine other counties. In all these twelve and a half counties in which field agents were employed, 339 barberry bushes, 77 sprouting bushes, and 941 seedlings were found on 44 different properties.

In addition to the actual survey for barberries, a careful stem-rust survey was carried on this year. The development and severity of this disease was observed over the entire State during the growing season. In order to check more accurately on the losses to small-grain crops, elevator men in every section of the State were interviewed in regard to the quality as expressed by test weight per bushel, the grade, and the amount of shriveling. These interviews, together with data received through the observations on the development of stem rust, served as a basis for making loss estimates.

Educational work for the purpose of informing people of the merits and progress of the campaign was continued during this year. This phase of the project may be summarized as follows: A total of 82 demonstrations was held, consisting of fair demonstrations, field demonstrations, and miscellaneous demonstrations. Material for study was sent to 3,543 schools and colleges. A speaker was supplied to 46 meetings. A total of 262 stories

was published in weekly and daily papers, including 28 stories sent out by the college editors, and three magazine articles. Bulletins and circulars aggregating 27,550 copies were distributed, and 350 posters placed in conspicuous places. Approximately 41,152 pieces of mimeographed or multigraphed material and about 37,000 miscellaneous pieces were sent to various people during the calendar year.

Present Status of Barberry Eradication Campaign in South Dakota, December 31, 1927

1. The first survey of the entire State was completed at the close of the field season in 1924. A total of 51,256 large barberry bushes and 15,078 seedlings was found on 883 different properties as a result of this survey.

2. A second survey was started in 1923 to find and destroy any barberries that were not located in the first survey. Nearly 30 counties have been covered in this survey, and as a result 2,271 bushes and 1,389 seedlings have been found on 247 properties. (See Map No. 1.)

3. Resurvey has followed the first survey whenever necessary for the purpose of checking up on the properties on which barberries were found. The results of this survey show that 43,102 bushes were sprouting and that 9,495 seedlings had grown up from barberry seeds. In addition, 7,364 new bushes and 11,265 seedlings were found on 114 different properties.

4. During the entire campaign a grand total of 131,725 bushes, sprouting bushes, and seedlings has been found and destroyed on 1,244 different properties in South Dakota. (See Map. No. 2.)

5. The use of chemicals for killing barberry bushes has practically solved the sprouting bush problem. New seedlings and escaped bushes, however, are found each year. The most difficult problem at present is to find all of these bushes that have escaped from cultivation by means of seed dissemination.

6. Education and publicity has helped to clear away some of the skepticism which was manifested early in the campaign relative to the merits of the project. Practically everyone has heard of the barberry eradication campaign and is more or less familiar with the facts regarding it, but much remains to be done before the public in general has a thorough understanding of this activity.

Rust Spreads from Barberries

7. Many instances of the spread of black stem rust from common barberries to grains and grasses have been found and recorded in South Dakota since the barberry eradication campaign was started in April, 1918. Barberry bushes also have been located by tracing the source of the stem-rust attack directly to them. However, not all rust spreads have been found by our field men. Many of the best examples of the spread of rust from barberries are those which have been noted year after year by the farmers who lived near the offending bushes.

Widespread epidemics that cover a number of counties or a large portion of the State cannot be traced in most cases to single barberry locations. However, the large numbers of infected barberries found in South Dakota and the many local stem-rust spreads from them have undoubtedly been the principal source of the rust that started these epidemics. With its broad, open prairies and its contiguous grain fields, South Dakota offers abundant opportunity for the spread of stem-rust spores. Consequently, the barberry bushes responsible for a rust spread may be found at some distance from the most severe infection.

8. The removal of barberry bushes has decreased the amount of stem rust in instances where rust has been found spreading from the bushes. A careful check-up each year has shown that stem rust, since the bushes were killed, has been no heavier on these farms than in the surrounding locality.

Stem Rust Losses in 1927

Black stem rust was present in alarming proportions during 1927 in South Dakota. It occurred over a wide area, but the most severe damage was confined to districts in which crops were unusually late. The latest estimates show that the damage from this rust is less than was first anticipated by many observers. In spite of the fear before harvest time of great damage from stem rust, the acre yields of wheat, oats, and barley all exceed the five-year average in this State.

Moreover, spring wheat received on the Minneapolis market from South Dakota, according to a report showing the gradings made by licensed inspectors, averaged 58.3 pounds per bushel in 1927, compared with an average of 58 pounds in 1926, and 56 pounds for the ten-year period 1917 to 1926, which did not include the bad rust year of 1916. By this report it is shown that the quality of wheat was higher in 1927 than in former years, despite the presence of an apparent stem-rust epidemic.

By eradicating all the barberry bushes, the local infection or early infection is eliminated. By holding back the early development of rust, losses will be greatly reduced. Although stem rust was present this year, it did not have sufficient time to develop to a maximum in spite of the late crops. This is exactly what is expected of barberry eradication--not necessarily to eliminate rust altogether, but to delay it in such a way as to avoid severe losses.

Reasons for Epidemic

Granting that stem-rust infection seemed unusually heavy in 1927, one must remember that millions of rust-spreading barberries remain in the 13 States of the barberry eradication area. All of these are potential starters of stem rust.

In South Dakota alone, more than 1,200 barberries were destroyed in 1927, while in the six northwest States, including Iowa, Nebraska, Minnesota, Montana, and the two Dakotas, over 50,000 bushes were destroyed this year. All of these barberries were near enough to the grain fields of South Dakota to be responsible for aiding the stem-rust epidemic this season. In addition, there still are thousands of barberries in South Dakota and possibly millions in the six States mentioned.

It is not necessary that a barberry bush be located near a grainfield in order to spread the devastating rust. Rust spores are produced early in the spring on the barberry bush. These spores are very small and are easily carried by the wind, which deposits them on the grains. The wind can carry the rust for many miles. In fact, cases have been found where one barberry bush has spread rust infection to fields many miles distant. Stem rust on grains does not mean that a barberry bush is growing in the immediate vicinity--it may come from a bush in the next county, or perhaps in the next State.

Harvest was from ten to fifteen days later than usual over most of the State. This gave ample opportunity for a small amount of early rust from the remaining barberries to develop sufficiently to cause damage before the grain was cut. Once started, stem rust multiplies and spreads very rapidly. The additional ten to fifteen days before harvest this year allowed a pronounced increase in development over that which occurs in a normal growing season.

Difficulties of Survey and Eradication

The complete eradication of the common barberry from South Dakota is a difficult task. This job is not nearly complete. Years will have passed before the State can be pronounced entirely free from these rust-spreading bushes.

Barberries have been planted on home sites that are now abandoned. Weeds, shrubbery, and trees hide bushes from view, so that an extremely careful survey is necessary. Every foot of natural and planted trees or shrubbery must be searched. The difficulty is increased many fold by the fact that the bushes that have sprung from scattered seeds may be growing in almost inaccessible places and in many instances are completely hidden by the surrounding vegetation. Escaped barberry bushes have been found in swamps, river lowlands, rocky ledges, cliffs, and steep hillsides. Often the barberry seeds fail to germinate for three or four, or as many as seven or more years. After germination, several years may pass before the seedlings are big enough to be easily found.

A new area of escaped barberries was located in the city of Hot Springs this year. Nearly 200 barberries were found growing out of the rocky cliffs of the Black Hills. The outer limits of this area have not yet been found. Every foot within a five-mile radius of the city will have to be covered carefully before this area can be pronounced free of barberries.

Other Control Measures

In addition to eradicating barberries, there are other measures which should be used in controlling stem rust. These include the early sowing of crops, the use of early varieties, and the breeding of varieties resistant to stem rust. All of these measures should be continued simultaneously with barberry eradication, at least until the barberries are more nearly cleaned out of the State than at present. The treating of grain crops with sulphur dust shows some promise. However, this is in the experimental stage, and much remains to be done on this control measure before it can be known whether it will be of practical use.

Other Cereal Rusts

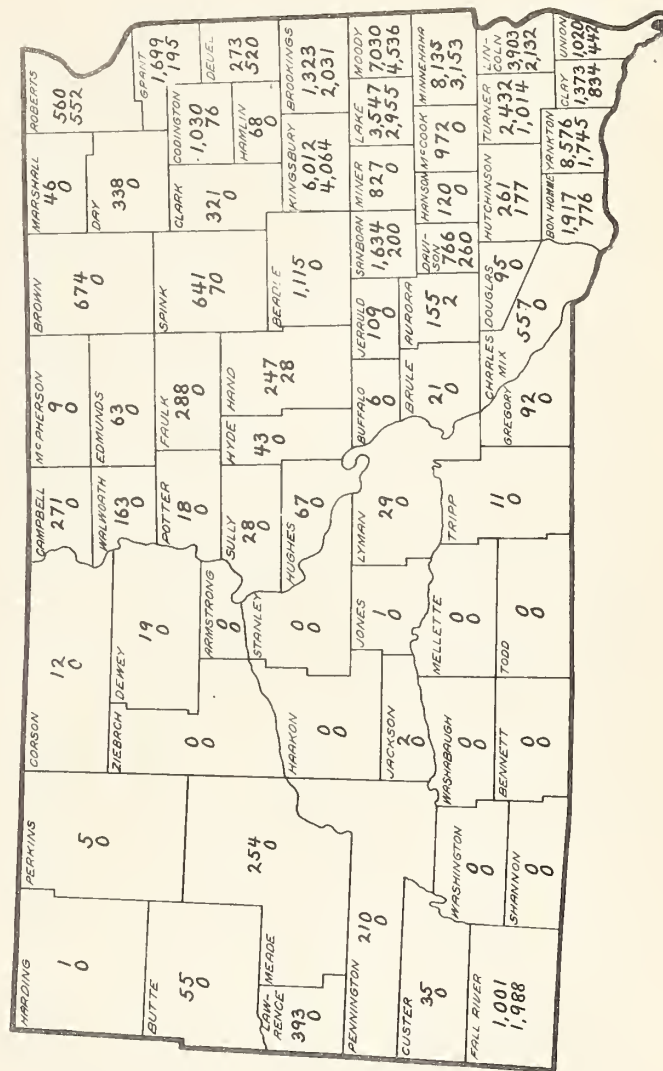
Stem rust is not the only rust that attacks cereal crops. During 1927, an epidemic of leaf rust appeared on wheat. This rust was present both earlier and in far greater quantity than stem rust. Fortunately, this disease does not usually do great damage, at least not comparable to stem rust. There was also an epidemic of crown rust, or leaf rust, on oats, which caused considerable damage to the 1927 oat crop. In addition, there is a leaf rust of rye and of barley. Neither of these rusts has been of much consequence so far in South Dakota.

It should be thoroughly understood that barberry eradication will never control the leaf rusts of these crops. It is a control measure for stem rust only. Other control measures will have to be employed for the leaf rust. Stem rust and leaf rust are somewhat similar in appearance, but are entirely different diseases. A careful identification should be made before a rust is called either leaf rust or stem rust. Specimens will be identified if sent to the State Leader of Barberry Eradication, South Dakota State College, Brookings, South Dakota.

Conclusion

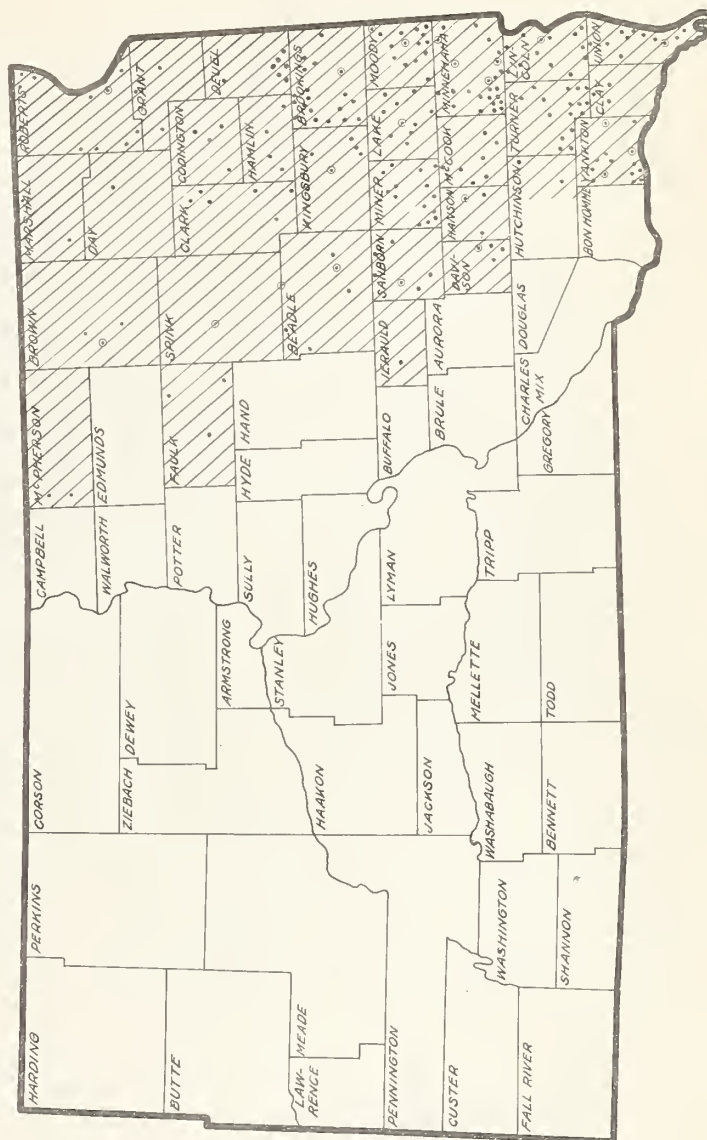
It is definitely known that the common barberry spreads stem rust. This is no longer a theory. Therefore, every barberry bush left growing in the community is a menace to the small-grain crops. The cooperation of every citizen is essential to the successful completion of the campaign. Whenever a shrub is found which is believed to be barberry, a sample should be sent to the Barberry Eradication Office, South Dakota State College, Brookings, South Dakota.

*NUMBERS OF BARBERRY BUSHES AND SEEDLINGS FOUND
1918-1927*



COUNTIES COVERED IN SECOND SURVEY AND THE APPROXIMATE LOCATION OF BARBERIES FOUND

SOUTH DAKOTA



- ▨ AREA COVERED IN SECOND SURVEY
- FARMS HAVING BARBERRY BUSHES
- ⊙ TOWNS HAVING BARBERRY BUSHES

SURVEYS MUST BE CONTINUED FOR TEN YEARS TO INSURE THAT THE STATE IS
REASONABLY FREE FROM BARBERIES

